

Remarks/Arguments

Claim 16 has been canceled, without prejudice. Claims 21, 22 and 23 have been amended. Claims 24 and 25 have been added. Claims 1-15 and 17-25 are in the application upon entry of this amendment. A declaration under 37 C.F.R. 1.132 is enclosed with this response. Entry of this amendment, and reexamination and reconsideration of the subject application are respectfully requested in light of the above amendments, the enclosed declaration and the following remarks.

Applicants acknowledge with gratitude the Examiner's decision to allow claim 16 if rewritten in independent form. Claim 16 has been canceled, and is resubmitted herewith as newly added independent claim 24. Applicants respectfully submit that claim 24 is in condition for allowance.

Claims 21-23 have been amended by indicating that R can be isopropyl. Support for these amendments can be found in the applicants' specification at page 20, line 16.

Claim 25 which specifies that component (C) is tri-2-ethyl hexyl borate has been added. Support for the limitation that component (C) is tri-2-ethyl hexyl borate can be found in the applicants' specification at page 19, line 25 to page 20, line 18, and particularly page 20, line 16.

The Examiner's attention is directed to the declaration under 37 C.F.R. 1.132 which is enclosed with this response. In this declaration, the results of tests employing the GF-3/GF-4 Sequence VIII Bearing Corrosion Engine Tests are presented. The results indicate that a test formulation containing tri-2-ethyl hexyl borate (Example I) exhibits improved results using the GF-3/GF-4 Sequence VIII Bearing Corrosion Engine Tests as compared to the same formulation (Example C-I) not containing tri-2-ethyl hexyl borate.

Claims 1-15 and 17-23 have been rejected under 35 U.S.C. §103(a) as unpatentable over Nalesnik et al. (U.S. Patent 6,103,674) in combination with the teachings in Horodysky (U.S. Patent 4,692,257) or Baranski et al. (U.S. Patent 5,698,499). This rejection is respectfully traversed for the following reasons.

The applicants' claimed invention relates to a lubricating oil composition comprising: (A) a base oil; (B) a molybdenum and sulfur containing composition derived from a basic

nitrogen containing compound, a molybdenum compound and carbon disulfide; (C) certain borated esters; and optionally (D) a phosphorus containing compound provided the amount of phosphorus does not exceed about 0.10% by weight.

Zinc dialkyl dithiophosphates (ZDDP) are known for use as antiwear and antioxidant additives in engine lubricating oil compositions. In the past typical concentrations of phosphorus contributed to the lubricating oil compositions by these compounds exceeded 0.10% by weight. However, ILSAC GF-3 requirements limit the amount of phosphorus that can be used in a lubricating oil composition to a maximum concentration of 0.10% by weight. The problem therefore is to provide for a reduction in the amount of phosphorus-containing additives used in these lubricating oil compositions and yet provide the lubricating oil with sufficient properties to pass certain required engine tests including the GF-3/GF-4 Sequence VIII Bearing Corrosion Engine Test.

Nalesnik et al. discloses the use of molybdenum and sulfur containing compositions in lubricating oil compositions as antiwear agents and antioxidants. Nalesnik et al. discloses the replacement of part of the ZDDP in a lubricating oil composition with such molybdenum and sulfur containing compositions to restore antiwear and antioxidant properties lost with the reduction in ZDDP. However, a problem with the use of these molybdenum and sulfur containing compositions as partial replacements for ZDDP is that the resulting lubricating oil formulations exhibit poor performance results when tested with the GF-3/GF-4 Sequence VIII Bearing Corrosion Engine Test. This is evident from the results for Examples X-1 and X-2 which are provided in the applicants' specification at pages 25-27, and Example C-I which is provided in the enclosed declaration. In Examples X-1, X-2 and C-I, comparative tests outside the scope of the applicants' claims were conducted. These examples employed the use of a molybdenum and sulfur containing composition as a partial replacement for ZDDP which was used at a reduced level. The GF-3/GF-4 Sequence VIII test results for these examples were poor.

The applicants discovered that when certain borated esters were used, significant improvements in the GF-3/GF-4 Sequence VIII test results could be achieved. This is evident from the results achieved with Examples 1-3 which are also disclosed at pages 25-27 of the applicants' specification, and Example I which is disclosed in the enclosed

declaration. In Examples 1-3, lubricating oil formulations were used that contained a low level of ZDDP, a molybdenum and sulfur containing composition, and tri-n-butyl borate (a borated ester). The results for Examples 1-3 when compared to the results for Examples X-1 and X-2 clearly show improved GF-3/GF-4 Sequence VIII performance when the borated ester was used. Similarly, in Example I, a lubricating oil formulation was used that contained tri-2-ethyl hexyl borate (a borated ester). The results for Example I when compared to the results for Example C-I clearly show improved GF-3/GF-4 Sequence VIII performance when the borated ester was used.

Nalesnik et al. does not disclose or suggest use of the borated esters specified in the applicants' claims. To make up for the deficiencies in the teachings in this reference, the Examiner cites Horodysky and Baranski et al. Horodysky discloses the use of certain borated hydrocarbyl viscinal diols as lubricant additives. Baranski et al. discloses the use of certain phenolic borates as lubricant additives. However, none of these references disclose or suggest combining the boron compounds disclosed therein with the molybdenum and sulfur containing compositions disclosed in Nalesnik et al. in a lubricating oil composition characterized by a low level of or the absence of phosphorus as specified in the applicants' claims. None of the cited references provide the required motivation for combining the teachings of Nalesnik et al. with the teachings in Horodysky or Baranski et al.

The Examiner contends that the motivation to combine the teachings in Nalesnik et al. with the teachings in Horodsky or Baranski et al. is provided in Nalesnik et al. at column 10, lines 53-55, wherein the reference discloses that "organo borates" can be added to the disclosed lubricating oil compositions. Nalesnik et al. does not identify any specific organo borates that may be used, and the reference certainly does not disclose or suggest the borated esters specified in applicants' claims. Moreover, the applicants discovered that not all organo borates provide the solution to the problem that they sought to overcome. For example, the applicants discovered that the addition of a borated polyisobutene substituted succinimide to a lubricating oil composition containing a reduced level of ZDDP and the molybdenum and sulfur containing composition specified in the applicants' claims was not sufficient to provide the desired improvement in the GF-3/GF-4

Sequence VIII test. In this regard, a comparison of the results for applicants' Examples 1-3 wherein tri-n-butyl borate (a borated ester) was used as the boron-containing compound to the results for Example X-3 wherein a borated polyisobutene substituted succinimide was used as the boron-containing compound clearly indicates significantly improved results for Examples 1-3 as compared to Example X-3. Thus, it is respectfully submitted that the mere suggestion in Nalesnik et al. that organo borates could be added to the lubricating composition disclosed therein would not have been sufficient motivation to the skilled artisan to combine the teachings in Nalesnik et al. with the teachings in Horodsky or Baranski et al. to overcome the applicants' problem and arrive at the applicants' claimed invention.

The Examiner acknowledges that improved GF-3/GF-4 Sequence VIII have been noted, but contends that the claims are not limited to tri-alkyl borates as the boron-containing compound. While the applicant believes that the results suggest that they are entitled to claims to all of the borated esters specified in applicants' claims, the Examiner should note that applicants' claims 21-25 are limited to tri-alkyl borates. Thus, in following the Examiner's logic, at least claims 21-25 should be deemed to be allowable

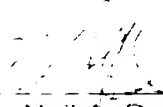
Withdrawal of the rejections of claims 1-15 and 17-23 for obviousness over the teachings in Nalesnik et al. taken in combination with the teachings in Horodsky or Baranski et al. is believed to be warranted and is respectfully requested.

Applicants respectfully submit that the application is now in condition for allowance. A Notice of Allowance is respectfully submitted. In the alternative, entry of the amendment and the enclosed declaration is requested for purposes of an appeal. Any additional fees required by the filing of this paper may be charged to Deposit Account 12-2275.

Respectfully submitted,

THE LUBRIZOL CORPORATION

By


Neil A. DuChéz
Reg. No. 26,725

29400 Lakeland Boulevard
Wickliffe, Ohio 44092-2298
(216) 621-1113